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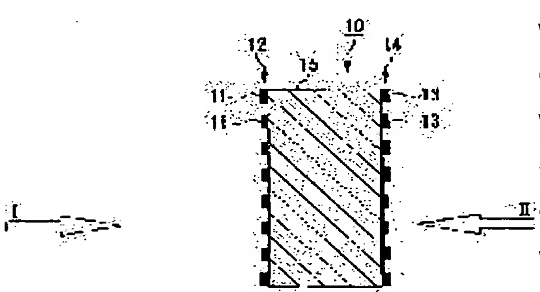
(54) RADIO WAVE ABSORBER



(57)Abstract:

PROBLEM TO BE SOLVED: To provide a radio wave absorber for absorbing a radio wave having a frequency being shielded selectively in which the thickness can be reduced as compared with a conventional $\lambda/4$ type radio wave absorber.

SOLUTION: The radio wave absorber 10 comprises a dielectric 15 having one side on which a radio wave absorbing surface 12 exhibiting a phase regulating function is formed and the opposite side on which a radio wave reflecting surface 14 is formed.

CLAIMS

[Claim(s)]
[Claim 1]A wave absorber, wherein it has a dielectric, a wave absorption side which has a phase adjustment function is formed in this dielectric surface and a radio wave reflecting surface is formed in a dielectric surface of an opposite hand with a wave absorption side.
[Claim 2]The wave absorber according to claim 1, wherein two or more metal wire elements which a wave absorption side became independent of are allocated.
[Claim 3]The wave absorber according to claim 2 in which a metal wire element of a wave absorption side is characterized by having two or more open ends.
[Claim 4]The wave absorber according to claim 2 in which a metal wire element of a wave absorption side is characterized by an annular thing.
[Claim 5]The wave absorber according to any one of claims 1 to 4, wherein two or more independent metal wire elements which have the specific length corresponding to an electric wave of frequency which a radio wave reflecting surface tends to cover are allocated.
[Claim 6]The wave absorber according to claim 5, wherein a metal wire element of a radio wave reflecting surface is 1/2 to **25 in consideration of a conversion dielectric constant of an electric wave of frequency which has two or more open ends and the length of a metal wire element between these open ends tends to cover of wavelength% of within the limits.
[Claim 7]The wave absorber according to claim 5 characterized by being **25% of within the limits from wavelength in consideration of a conversion dielectric constant of an electric wave of frequency which a metal wire element of a radio wave reflecting

surface is annular, and the length of 1 round tends to cover.
[Claim 8]The wave absorber according to any one of claims 1 to 7, wherein a wave absorption side and a radio wave reflecting surface are established in three or more places in total.
[Claim 9]The wave absorber according to any one of claims 1 to 8 in which a radio wave reflecting surface is characterized by allocating two or more kinds of metal wire elements.
[Claim 10]The wave absorber according to any one of claims 1 to 9 in which a wave absorption side is characterized by having the impedance that an electric wave of frequency which it is going to cover reflected in the surface will be 40% or less.
[Claim 11]The wave absorber according to any one of claims 1 to 10, wherein transmission loss of an electric wave in frequency which is separated from frequency which it is going to cover not less than 20% is 10 dB or less.
[Claim 12]The wave absorber according to any one of claims 1 to 11, wherein a wave absorption side is established in two or more places.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to a wave absorber.
It is related with the wave absorber which absorbs the electric wave of specific frequency selectively especially.

[0002]
[Description of the Prior Art]While use of permanent communication indoor [, such as personal handy phone in a place of business and wireless LAN,] shows breadth in recent years, it is becoming indispensable to improve the radio wave environment in an office from the point of the malfunction and noise prevention by the invasion electric wave from the leakage control and the outside of information. As a member for maintenance of such radio wave environment, the thing of various types is already proposed.
[0003]For example, electromagnetic shielding Intel Gent Bill who can do electromagnetic shielding members, such as metal and a ferrite, by adding to the main part of a building in a large frequency band using the electric wave of arbitrary

frequency as for information and telecommunications is proposed by JP,6-99972,B.
[0004]However, in the thing using wave absorbers, such as electric wave reflectors, such as such a griddle, a metallic net, a metallic mesh, and a metallic foil, and a ferrite, as an electromagnetic shielding member. In order that there might be no frequency selection nature in those electromagnetic shielding nature, there was a problem of covering to electric waves other than the frequency which it is going to cover.
[0005]Since said electric wave reflector reflects TV radio waves and causes radio disturbance (generating of a ghost), the part which can be used is restricted. Since shielding performance falls greatly by the crevice between electromagnetic shielding members, in order to demonstrate enough the shielding performance which each member has, the stringency in execution surfaces, such as connection, grounding, etc. between members, is required.
[0006]Only the electric wave of the specific frequency which it is going to cover by making JP,10-169039,A arrange a linear antenna element periodically as what cancels such a problem is covered, and the building that the connection and grounding between members are also unnecessary is proposed. However, what is depended on reflection loss mostly came out, and, for a certain reason, the cover had the problem that fluctuation of a CRT picture, malfunction of communication equipment, etc. by back-scattering may take place in the inside of an office.
[0007]As what solves the problem resulting from the radio wave reflection in the inside of such an office, the wave absorber which absorbs the electric wave of specific frequency selectively to JP,9-162589,A or JP,5-335832,A is proposed. The wave absorber of JP,9-162589,A makes an element with a larger electric resistance value smaller than an insulator than a conductor arrange, and absorbs the electric wave of specific frequency (above). However, the cover by this wave absorber, Since it was what is depended on the ohm loss of the alternating current which flows through the inside of an element by the exposure of an electric wave, in the element of minute volume, also in the electric wave of the frequency which it is going to cover, the penetration increased in practice, and the absorbable amount of electric waves had the problem of becoming small.
[0008]As the wave absorber of JP,5-335832,A is shown in drawing 8, the coating resistor 31 and the electric wave reflector 32 are the wave absorbers 30 arranged on both sides of the dielectric 33 (1/4 of the radio wave wavelength [thickness] in this dielectric).
It is what is called lambda/4 type wave absorber that absorbs only the electric wave of specific frequency selectively.

[0009]The principle of the wave absorption by this lambda/4 type wave absorber is explained referring to drawing 9. When entering into other media B (electric wave reflector 32) out of the medium A with an electric wave (dielectric 33) generally, reflection coefficient S_{AB} of the electric wave in an A/B interface is expressed with a following formula (1).

$S_{AB}=(Z_B-Z_A)/(Z_B+Z_A)$ (1)

(Z_A is an electric wave characteristic impedance of the medium A among a formula, and Z_B is an electric wave characteristic impedance of the medium B.)

[0010]Here, since the medium B is the electric wave reflector 32, i.e., a conductor, (Z_B**0), it is set to S_{AB}**-1, and as for an electric wave, it is thoroughly reflected by an A/B interface and a big standing wave stands into the medium A. At this time, the value of load impedance Z in the inside of the medium A is 0 in an A/B interface (X= 0), as expressed with a following formula (2).

It becomes infinite infinity from an A/B interface in the place of X=lambda/4 (lambda is the wavelength of an electric wave).

$Z=jZ_A$tan2betaX (2)

(j is a prime number unit among a formula, beta is the imaginary part (acoustic phase coefficient) of a sound propagation coefficient, and X is the distance from an A/B interface.)

[0011]If the coating resistor 31 of the impedance R is put on the position of this X=lambda/4, since the load impedance in this position is parallel composition with R and infinity, it will be set to about R, and reflection coefficient $S_{lambda/4}$ in this position will become a value expressed with a following formula (3).

$S_{lambda/4}=(R-Z_A)/(R+Z_A)$ (3)

That is, if the impedance R of the coating resistor 31 is completely equal to electric wave characteristic-impedance Z_A of the medium A (dielectric 33), reflection coefficient $S_{lambda/4}$ will be set to 0.

[0012]As compared with the thing of JP,9-162589,A, this wave absorber has the large amount of wave absorption, and it is excellent also in frequency selection nature. however — as opposed to the reflected component of the electric wave at which electric waves other than the frequency which it is going to cover are reflected in, namely, the frequency selection nature arrives from the coating resistor side in order to back the back side of a dielectric with electric wave reflectors, such as a metallic foil and a metallic net, — it is — it had a problem to say. It will be reflected regardless

of frequency and the electric wave which comes from the electric wave reflector side may have caused TV-radio-waves radio disturbance mentioned above.

[0013]As a wave absorber which absorbs selectively only the electric wave of the frequency which it is going to cover, and makes electric waves other than this penetrate bidirectionally, The wave absorber in which the coating resistor and the radio wave reflecting surface in which the metal wire element which has the specific length corresponding to the electric wave of the frequency which it is going to cover was allocated have been arranged on both sides of a dielectric at JP,2000-53484,A is proposed. However, the frequency of the electric wave which it is going to cover in lambda/4 conventional type wave absorber including this wave absorber became low, namely, thickness lambda / 4 of a dielectric had the problem that it became thick and the whole wave absorber became thick as wavelength became long.

[0014]

[Problem(s) to be Solved by the Invention]Therefore, the purpose of this invention absorbs selectively the electric wave of the frequency which it is going to cover, and there is in providing the wave absorber which can moreover make thickness thinner than lambda/4 conventional type wave absorber. The purpose of this invention is to provide the wave absorber which can make electric waves other than the frequency which it is going to cover penetrate bidirectionally further, does not have the necessity for connection between wave absorbers, or grounding, and is excellent in workability.

[0015]

[Means for Solving the Problem]A wave absorber of this invention has a dielectric, a wave absorption side which has a phase adjustment function is formed in this dielectric surface, and a radio wave reflecting surface is formed in a dielectric surface of an opposite hand with a wave absorption side. As for a wave absorption side, it is desirable to allocate two or more independent metal wire elements. Here, a metal wire element may have two or more open ends, and may be annular.

[0016]As for a radio wave reflecting surface, it is desirable to allocate two or more independent metal wire elements which have the specific length corresponding to an electric wave of frequency which it is going to cover. Have a metal wire element and here two or more open ends the length of a metal wire element between these open ends, May be 1/2 to **25 in consideration of a conversion dielectric constant of an electric wave of frequency which it is going to cover of wavelength% of within the limits, and a metal wire element, It may be annular and the length of 1 round may be **25% of within the limits from wavelength in consideration of a conversion dielectric

constant of an electric wave of frequency which it is going to cover. Suppose that those including a dielectric constant of a dielectric, thickness and a dielectric constant of a film used for a base material of a metal wire element, and thickness for which it asked equivalent are called a "conversion dielectric constant" in this invention.

[0017]A wave absorption side and a radio wave reflecting surface may be established in three or more places in total. In a radio wave reflecting surface, two or more kinds of metal wire elements may be allocated. As for a wave absorption side, it is desirable that it is what has the impedance that an electric wave of frequency which it is going to cover reflected in the surface will be 40% or less. As for a wave absorber of this invention, it is desirable for transmission loss of an electric wave in frequency which is separated from frequency which it is going to cover not less than 20% to be 10 dB or less. Two or more wave absorption sides may be established.

[0018]

[Embodiment of the Invention]Hereafter, this invention is explained concretely. Drawing 1 is a sectional view showing an example of the wave absorber of this invention. The wave absorption side 12 in which two or more metal wire elements 11 which this wave absorber 10 became independent of were allocated, and the radio wave reflecting surface 14 in which two or more independent metal wire elements 13 were allocated are arranged on both sides of the dielectric 15. The arrows I and II express the arrival directions of an electric wave among a figure, respectively.

[0019]Two or more independent metal wire elements 13 which have the specific length corresponding to the electric wave of the frequency which is going to cover the radio wave reflecting surface 14 are allocated in the dielectric 15 surface. Here, as for the construction material of the metal wire element 13, it is desirable for impedance to be a conductor which is about 0. That is, when conductors (metal wire element 13), such as a metal stick which is not grounded and a metal wire, are put on the place where the electric wave has come, some electric waves are absorbed and others are reflected by an interaction with the electromagnetic field which the alternating current which flows in a conductor makes. At this time, the ratio (an absorbed amount/reflected amount) of the absorbed amount of an electric wave and a reflected amount changes with the impedance of a conductor, and if impedance is about 0, that ratio will also be set to about 0.

[0020]As shown in drawing 2, the metal wire element 13 has the open end 20, and is set to 1/2 of the wavelength in the inside of the dielectric 15 of the electric wave of the frequency which the length of the metal wire element 13 between these open ends

20 tends to cover. That is, the interaction (absorption, reflection) of a conductor (metal wire element 13) and an electric wave becomes large when a conductor and an electric wave resonate, and this resonance takes place, when the length of the conductor between open ends is 1/2 of a radio wave wavelength.

[0021]You may be branching-shaped things, such as a thing, at a Y shape as shown in the thing of a cross-joint form as limitation not carried out to the linear thing which shows drawing 2 the shape of the metal wire element 13 but shown in drawing 3, and drawing 4. In a branching-shaped thing, the length from the turning point to the open end 20 drops to 1/4 of a radio wave wavelength. The shape of the metal wire element 13 may be annular things, such as a triangle, a rectangular head, a circle, etc. which are shown in drawing 5 – drawing 7. In the case of the length as a radio wave wavelength with the same length of 1 round, the resonance of a conductor and an electric wave takes place in an annular thing.

[0022]In what is difficult for making into the same length all the metal wire elements 13 allocated in the radio wave reflecting surface 14, and has the open end 20. More preferably the length to **10% of range to 1/2 to **25 in consideration of the conversion dielectric constant of the dielectric 15 of the electric wave of the frequency which it is going to cover of wavelength% of range in an annular thing. The length of 1 round is more preferably permitted to **10% of range from the wavelength in consideration of the conversion dielectric constant of the dielectric 15 of the electric wave of the frequency which it is going to cover to **25% of range.

[0023]The absorption and reflection in such a radio wave reflecting surface 14 take place also to the electric wave of the metal wire element 13 circumference directly not only to the electric wave which enters into the surface of the metal wire element 13 (however, the more it separates from the metal wire element 13, the more absorption and a reflected amount decrease). That is, in the radio wave reflecting surface 14 in which the metal wire element 13 was allocated, it resonates, when the distance between the open ends 20 of the metal wire element 13 is 1/2 of a radio wave wavelength, and an interaction becomes large and the electric wave of a conductor and the resonating wavelength (frequency) is almost reflected in respect of this. In other words, for the metal wire element 13 of this length, and the electric wave of the wavelength (frequency) not resonating, that most penetrates this radio wave reflecting surface 14, without a reflector becoming.

[0024]The radio wave reflecting surface 14 is a thing using the character which a line conductor which was stated above has, and is made into a radio wave reflecting surface in arranging the metal wire element 13 of the electric wave (however, the

wavelength wavelength in the inside of a dielectric) of the frequency which it is going to cover, and length which resonates. It becomes so good that the interval between each metal wire elements 13 is so small that the line width and thickness are large since the reflection performance of such a radio wave reflecting surface 14 is actually decided by the size of the alternating current which flows in each metal wire element 13 with a certain impedance. However, since the reflection in the metal wire element 13 surface of electromagnetic waves (frequency contains the thing more than infrared light) other than the electric wave of the frequency which it is going to cover also becomes large simultaneously, frequency selection nature worsens. Then, in consideration of the reflection performance and frequency selection nature to an electric wave of the frequency which it is going to reflect, the interval between the line width of the metal wire element 13, thickness, and each metal wire element 13 is determined practically.

[0025]Although six kinds of metal wire elements were illustrated from drawing 2 to drawing 7 here, it is clear that the shape of a metal wire element is not what is limited to these at the aforementioned explanation. Such a metal wire element can be formed by removing an excessive metallic foil by etching, after sticking a metallic foil on the dielectric 15 and, performing masking by ultraviolet curing resin for example, according to the pattern of a metal wire element. Limitation is not carried out to that by which the radio wave reflecting surface 14 formed the metal wire element 13 in the surface of the dielectric 15 directly as shown in drawing 1, A metal wire element may be provided on the base material which consists of dielectrics, such as other high polymer films, glass, ceramics, and paper, and the base material may be arranged on the dielectric 15 surface. Since the array surface of the metal wire element which became independent separately is used as a radio wave reflecting surface, connection and grounding of wave absorbers are unnecessary. This makes workability very simple and is another big advantage of the wave absorber of this invention.

[0026]Two or more metal wire elements 11 which the wave absorption side 12 became independent of are allocated in the dielectric 15 surface. Limitation is not carried out to that by which the wave absorption side 12 formed the metal wire element 11 in the surface of the dielectric 15 directly as shown in drawing 1, A metal wire element may be provided on the base material which consists of dielectrics, such as other high polymer films, glass, ceramics, and paper, and the base material may be arranged on the dielectric 15 surface. The shape of the metal wire element 11 is not limited especially like the above-mentioned metal wire element 13, and the shape shown by drawing 7 from drawing 2 is mentioned, for example.

[0027]The construction material of the metal wire element 11 is determined as follows. Since the reflection coefficient in the surface of a wave absorption side will be set to 0 if the impedance R of a coating resistor (wave absorption side 12) is completely equal to electric wave characteristic-impedance Z_A of the medium A (dielectric 15) as mentioned above, The thing of a coating resistor near electric wave characteristic-impedance Z_A of the medium A is [the wave absorption side 12 / the impedance R] preferred.

[0028]Therefore, if it seems that the wave absorption side 12 has such impedance R, the construction material of the metal wire element used for the wave absorption side 12 will not receive essential limitation. If the media A are air and a vacuum here, electric wave characteristic-impedance Z_A will serve as an electric wave characteristic impedance (**377ohm) of free space, and, in the case of glass, an organic high polymer, etc., it will become with the electric wave characteristic impedance in the inside.

[0029]However, the impedance R of the wave absorption side 12 which consists of the conductive high metal wire element 11 is low compared with the electric wave characteristic impedance of free space, and it is difficult to bring close to electric wave characteristic-impedance Z_A. Then, in order to obtain the wave absorber which is satisfactory practically, the wave absorption side 12 shall have the impedance R which makes more preferably reflection of the electric wave of the frequency which it is going to cover in the surface 35% or less 40% or less. In order to fully absorb the electric wave of the frequency which it is going to cover which comes from the direction of I, it is necessary to make impedance match between a progressive wave and a reflected wave in the surface of the wave absorption side 12. Therefore, as for the impedance and inductance of the wave absorption side 12, and conductance, it is desirable to determine using a transmission-line theory or electromagnetic field analysis.

[0030]The wave absorption side 12 has the work (phase adjustment function) to which the phase of the electric wave of the frequency which it is going to cover is shifted by composition with a penetration electric wave and the electric wave to which it reradiates from a metal wire element. The value of load impedance Z in the inside of the medium A expressed with the above-mentioned formula (2) by shifting the phase of the electric wave of the frequency which it is going to cover, The position X to which load impedance Z in the inside of the medium A becomes infinite in the place of X=lambda/4 (lambda is the wavelength of an electric wave) according to the shift of a phase without becoming infinite infinity is also shifted from an A/B interface.

Therefore, it becomes possible by adjusting the grade of a phase shift to adjust position (X) of the wave absorption layer 12 from the radio wave reflecting surface 14 (A/B interface), i.e., change of the thickness of the wave absorber 10.

[0031]In order for the length of the metal wire element 11 to shift a phase and to pass this, without reflecting the electric wave of the frequency which it is going to cover, In the case of what has an open end, it is preferred that it is what is different not less than **2% from 1/2 in consideration of the conversion dielectric constant of the dielectric 15 of the electric wave of the frequency which it is going to cover of wavelength. It differs not less than **10% more preferably. There is a possibility that reflection of the electric wave of the frequency which length tends to cover in less than 1/2 to **2 of wavelength% of metal wire element may become large. As for a length of 1 round of the metal wire element 11, in the case of an annular thing, it is preferred that it is what is different not less than **2% from the wavelength in consideration of the conversion dielectric constant of the dielectric 15 of the electric wave of the frequency which it is going to cover. It differs not less than **10% more preferably. There is a possibility that reflection of the electric wave of the frequency which length tends to cover with less than **2% of metal wire element from wavelength may become large.

[0032]In order to make thin thickness of the neighborhood 10, i.e., a wave absorber, the position of the wave absorption side 12 from the radio wave reflecting surface 14, In the case of what has an open end, 35% – 95% of range is suitable for the length of the metal wire element 11 to 1/2 of the wavelength in the inside of the dielectric 15 of the electric wave of the frequency which it is going to cover, and, specifically, 40% – 60% of its range is more preferred. When the capability for the length of the metal wire element 11 to change a phase with 1/2 of less than 35% of radio wave wavelengths declines and it exceeds 95%, there is a possibility that reflection of the electric wave of the frequency which it is going to cover may become large. In the case of an annular thing, 35% – 95% of range is suitable for a length of 1 round of the metal wire element 11 to the wavelength in consideration of the conversion dielectric constant of the dielectric 15 of the electric wave of the frequency which it is going to cover, and 40% – 60% of its range is more preferred.

[0033]If the dielectric 15 is what is called an insulator, it cannot receive restriction essential to the construction material, such as glass, ceramics, and an organic high polymer, and it can also be used for it combining two or more construction material. The gas of a vacuum, air, and others shall also be contained in the dielectric in this invention.

[0034]The thickness of the dielectric 15 is suitably determined by the grade of the phase shift in the dielectric constant of a dielectric, the frequency of the electric wave which it is going to cover, and the wave absorption side 12. Also about the thickness determination of the dielectric 15, it is effective to use a transmission-line theory and electromagnetic field analysis.
[0035]Since the wave absorption side 12 has a phase adjustment function if it is in such a wave absorber 10, According to the grade of the phase shift by the wave absorption side 12, the interval of the wave absorption side 12 and the radio wave reflecting surface 14 can be adjusted, and the frequency of the electric wave which it is going to cover can make thickness thin compared with the lambda/4 same conventional type wave absorber. Since the wave absorption side 12 and the radio wave reflecting surface 14 which function also as a resistor are arranged on both sides of the dielectric 15, The electric wave of specific frequency according to the grade of the phase shift by the interval and the wave absorption side 12 of the wave absorption side 12 and the radio wave reflecting surface 14 is absorbable among the electric waves which come from the direction of I.
[0036]Since the metal wire element 13 which has the specific length corresponding to the electric wave of the frequency which the radio wave reflecting surface 14 tends to cover is allocated, Reflecting the electric wave which comes from direction II among the electric waves of the frequency which it is going to cover, electric waves other than the frequency which it is going to cover can be made to penetrate bidirectionally, there is no necessity for connection between wave absorbers or grounding, and it excels in workability. Since the metal wire element 13 is allocated, if the radio wave reflecting surface 14 uses construction material with high transmissivity of light as the dielectric 15, the wave absorber obtained becomes what has the high transmissivity of light, and it can stick it on a windowpane etc.
[0037]Here, the state where the transmission loss of the electric wave in the frequency which separated not less than 20% is set to 10 dB or less from the frequency which it tends to cover that electric waves other than the frequency which it is going to cover can be made to penetrate bidirectionally is said.
[0038]As for the wave absorber of this invention, limitation is not carried out to the thing of the gestalt of the wave absorber 10 of the example of a graphic display, If the wave absorption side which has a dielectric and has a phase adjustment function in one surface of this dielectric is formed and the radio wave reflecting surface is formed in the dielectric surface of an opposite hand in the wave absorption side, For example, (1) The protective layer etc. which consist of a plastic film, glass, etc. could be

provided in the surface of that by which the dielectric and the wave absorption side are established in the both sides of the radio wave reflecting surface, (2) wave-absorption side, and/or a radio wave reflecting surface.

[0039]In a radio wave reflecting surface, two or more kinds of metal wire elements may be allocated. The wave absorber which has such a radio wave reflecting surface can reflect the electric wave of two or more frequency. If two or more wave absorption sides are established in the position according to each wavelength of the electric wave of two or more frequency reflected in this radio wave reflecting surface, the electric wave of two or more frequency is absorbable.

[0040]

[Example](Example 1) The film (L:2pf, R:0.01ohm/**) [at2.45GHz] which has the metal wire element 11 was stuck on the 14-mm-thick styrene foam (dielectric 15) surface. The film (R:0.01ohm/**) [at2.45GHz] which has the metal wire element 13 was stuck on the rear face of this styrene foam (dielectric 15), and the wave absorber as shown in drawing 1 was produced.

[0041]About this wave absorber, transmission loss measurement at 2.45 GHz to the electric wave which comes from the direction of I, and measurement of return loss were performed. A result is shown in Table 1. Transmission loss measurement measured what dB transmission quantity decreased compared with the case where there is no wave absorber using the transmission loss method. Return loss measurement measured what dB reflected amount decreased as compared with the metal plate of the same size using the reflection-electric-power method. The time base range was 2 to 20 GHz, and was measured in the S21 mode of a network analyzer (HYU red puckered company make, HP8522C).

[0042](Comparative example 1) The film which has a coating resistor (R:377ohm/**) was stuck on the 30.6-mm-thick styrene foam (dielectric) surface. The film (R:0.01ohm/**) [at2.45GHz] which has a metal wire element was stuck on the rear face of this styrene foam (dielectric), and the coating resistor and the radio wave reflecting surface produced the wave absorber arranged on both sides of a dielectric. About this wave absorber, transmission loss measurement and measurement of return loss were performed like Example 1. A result is shown in Table 1.

[0043]

[Table 1]

	2.45GHz 反射減衰量	2.45GHz 透過減衰量	全体の厚さ
実施例1	34dB	40dB	14mm
比較例1	40dB	40dB	30. 6mm

[0044]It was checked that thickness can be substantially made thin compared with the conventional wave absorber the wave absorber of this invention maintaining sufficient performance so that clearly from the result of Table 1.

[0045]

[Effect of the Invention]As mentioned above, as explained, the wave absorber of this invention, Since it has a dielectric, the wave absorption side which has a phase adjustment function is formed in this dielectric surface and the radio wave reflecting surface is formed in the dielectric surface of an opposite hand with the wave absorption side, The electric wave of the frequency which it is going to cover which comes from the wave absorption side side is absorbed selectively, it reflects and, moreover, the electric wave which comes from the radio wave reflecting surface side can make thickness thinner than lambda/4 conventional type wave absorber. If a radio−shielding room etc. are formed using the wave absorber of this invention, while being able to prevent generating of fluctuation of a screen, malfunction of permanent communication, etc. resulting from the reflection in the interior of a room of an electric wave and the invasion from outdoor which are used for the permanent communications (personal handy phone in a place of business, wireless LAN, etc.) in the interior of a room, Communication with the exterior, reception of public broadcasting, etc. are possible.

[0046]Electric waves other than the frequency which it is going to cover can be made to penetrate bidirectionally, there is no necessity for connection between wave absorbers or grounding, and a wave absorption side is excellent in workability, if two or more independent metal wire elements are allocated. If construction material with high transmissivity of light is used as a dielectric, the wave absorber obtained becomes what has the high transmissivity of light, and can be stuck on a windowpane etc.

[0047]If two or more independent metal wire elements which have the specific length corresponding to the electric wave of the frequency which a radio wave reflecting surface tends to cover are allocated, It can reflect, and the electric wave which comes from the radio wave reflecting surface side among the electric waves of the frequency which it is going to cover can make electric waves other than the frequency which it is going to cover penetrate bidirectionally, does not have the necessity for connection between wave absorbers, or grounding, and is excellent in workability. If construction material with high transmissivity of light is used as a dielectric, the wave absorber obtained becomes what has the high transmissivity of light, and can be stuck on a windowpane etc.

[0048]If the wave absorption side and the radio wave reflecting surface are established in three or more places in total, the electric wave of two or more frequency can be reflected. A radio wave reflecting surface can reflect the electric wave of two or more frequency, if two or more kinds of metal wire elements are allocated. The electric wave of the frequency which it is going to cover is efficiently absorbable, suppressing the reflection in respect of wave absorption, if a wave absorption side has the impedance that the electric wave of the frequency which it is going to cover reflected in the surface will be 40% or less. If the transmission loss of the electric wave in the frequency in which the wave absorber of this invention separated from the frequency which it is going to cover not less than 20% is 10 dB or less, the transmission quantity of electric waves other than the frequency which it is going to cover which penetrate a wave absorber will turn into sufficient quantity. If two or more wave absorption sides are established, the electric wave of two or more frequency is absorbable.

[Translation done.]